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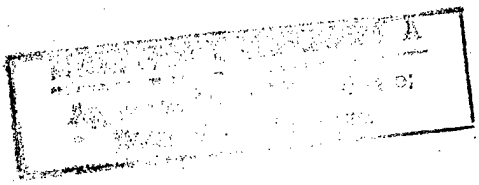

China Report

SCIENCE AND TECHNOLOGY

No. 169

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CHINA REPORT

SCIENCE AND TECHNOLOGY

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CONTENTS

PEOPLE'S REPUBLIC OF CHINA

ABSTRACTS

APPLIED SCIENCES

GUANGZHOU AREA MAKES PROGRESS IN PROMOTING LASER TECHNOLOGY

Guangzhou GUANGZHOU RIBAO in Chinese 6 Jun 82 p 2

[Article: "Applying Lasers in Industrial and Agricultural Production and in Medical Treatment, Guangzhou Area Makes Progress in Promoting Laser Technology"]

[Text] In recent years, Guangzhou area has selectively applied laser technology in industrial and agricultural production and in medical treatment with visible results. At present, the work of applying lasers in the Guangzhou area is being popularized among the basic levels. Research in the mechanism of lasers is deepening, and it is developing towards improvement of the quality of components and devices.

The application of laser technology began relatively early in the Guangzhou area. At Zhongshan University, one of our nation's bases of research in spectroscopy, spectroscopy specialist Professor Gao Zhaolan [7559 0340 5695] guided a research team in the Guangzhou area and it developed an active function. The City's science committee emphasized research in the application of lasers and grasped the establishment of a laser science and technology team. A group of scientific and technical workers who are young and energetic, who are deeply involved in research and who are enthusiastic about popularizing laser technology has emerged. In January of this year, the Guangzhou Laser Society was founded and academic exchange are more active than before.

In recent years, laser medical science has become popular in clinics. According to incomplete statistics, lasers have been used to treat 700,000 person-times throughout the area. The helium-neon laser has been widely used to treat inflammatory diseases with visible results. Some medical units have further combined laser treatment with other treatments and have greatly improved the effect of treatment. Laser is more commonly applied in surgery, dermatology, treatment of tumors, ophthalmology, otolarnygology, gynaecology, and obstetrics. The tumor hospital subsidiary to the Zhongshan Medical College used two methods to treat tumors with lasers. One method was excision using a carbon dioxide laser and the other was evaporation and irradiation by laser. Clinical analysis and comparison showed that the two methods above could rapidly and accurately remove focus and there was little or no bleeding during the operation. The method of using lasers to treat

superficial benign tumors and pre-cancerous pathological changes is simple and better than ordinary surgery, and the results are visible. The opthalmological hospital explored the use of the helium-neon laser to irradiate and treat keratitis of surface spots and realized satisfactory results. The Second People's Hospital in Guangzhou used lasers to treat the cervical vertebra syndrome. The method was simple, the patients did not suffer any pain and the results of treatment were good. The hospital also used the principles of acupuncture anesthesia. It used a low power helium-neon laser to irradiate acupuncture points for anesthesia. Clinical tests showed that laser anesthesia and acupuncture anesthesia produced basically the same results, but laser treatment also stimulated the growth of granulation and hastened the healing of the wound, killed pain and disinfected. The otolaryngological department of the First People's Hospital of the City used optical fiber conducted laser beams to penetrate the narrow and deep cavities of the ear, nose and throat and accurately irradiated focus or acupuncture points. Ideal results of treatment were realized. The percentage of recovery from false cysts of the auricle using laser treatment reached 85.6 percent. The period of recovery was fast and the patients felt that the treatment was convenient.

Concerned units carried out research in the use of lasers in industrial and agricultural production and solved some difficult problems in production. The Guangzhou Electro-mechanics Research Institute developed a cable diameter measuring and controlling device. It can quickly and accurately perform measurements and automatically control the outer diameter of electrical cables. It has provided an advanced technological equipment for automatic and high speed production of electrical cables, reduced the labor intensity of workers, conserved raw materials, and improved the quality of products. Each research unit has successfully developed the laser collimator for use in civil engineering, ore selection and construction measurements for laying pipes in river beds. The Huanan Engineering College researched a laser holographic information storage device which showed a promising future. The three-way laser collimator of the Wenchong Shipyard can connect the spatial relationships of dots, lines and planes of many directions for use in building, installation and construction of ships and large machinery. It is accurate and convenient. The agricultural science department is also popularizing the cultivation of plants using lasers, and definite achievements have been made.

On the basis of broad application, the scientific and technical workers in the Guangzhou area are carrying out further in depth studies of the theory of lasers. At the academic reporting conference on laser held recently in Guangzhou, a number of reports on achievements in basic theoretical research attracted the attention of academic circles. The "study of multiple exposure streaks and their use in measuring velocity" by teacher Zheng Shunxuan [6774 7311 2467] el al of the Physics Department of Zhongshan University tested the use of a helium-neon laser of low output power to photograph multiple exposure streaks and obtained good quality photos of streaks. The device can continuously photograph creeping speeds and the strain of objects under force. This research has passed the evaluation and review by the Sixth National Laser Conference. The "effects of tube length

and tube diameter in stimulated Raman scattering" and "the use of serially stimulated Raman effect to expand the wavelength of lasers" researched by that department have also made discoveries and presented unique opinions. Preliminary exploration of the theory of laser protection has been conducted by the Guangzhou Medical Academy, the City's Second People's Hospital, the City's epidemic prevention station and the provincial industrial diseases prevention and control hospital. They have individually or jointly conducted analysis of the chromosomes of laser workers, eye examinations and made physical examination reports. These efforts have an active significance in doing protective work well and in further popularizing the application of laser technology.

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CSO: 4008/189

POWER ENGINEERING INSTITUTION MEETS IN SHANGHAI

Shanghai DONGLI GONGCHENG [POWER ENGINEERING] in Chinese No 2, 1982

[Article: "Report on the Shanghai Meeting of the Power Engineering Institution of the Chinese Mechanical Society"]

[Text] The power Engineering Institution of the Chinese Mechanical Society held a meeting in Shanghai from February 24-27 of 1982. They discussed arrangements for academic activities in 1982 and preliminary ideas on institution work for the 1983-1985 period. Also discussed were matters related to preparing for holding the fourth annual meeting as well as editing and publishing work and organizational construction. Present at the meeting were 47 standing directors, directors and various special committee core members. The Chinese Mechanical Society also sent personnel to participate in the meeting. The meeting was chaired by Director Wang Xinmin [3769 2450 3046]. Secretary-General Yang Jinshu [2799 6930 1472] reported on the general situation of institution work for 1981, preliminary ideas on institution work for the 1983-1985 period as well as views on convening the fourth annual meeting of the Power Engineering Institution. Chen Xuejun [7115 1331 0193], Wang Dingguo [5502 1353 0948], Yao Fusheng [1202 4395 3932] and Qiu Changqing [6726 7022 3237] presented the general aspects and their personal understanding of the scientific and technological advancements of power engineering abroad.

The meeting basically reached a consensus on the following matters.

1. Arrangements For Institution Activities in 1982

Plans for institution activities in 1982 were discussed at the meeting and each specialized committee was to actively make preparations. Further, based on a proposal by the turbine specialists, a symposium was added on the technical problems of air coolers. At the same time, the "Academic Symposium on the Key Technical Problems of Large Scale Steam Turbines" originally set to be held in 1982 was changed to the "Academic Symposium on the Problems of Strong Vibrations in Large Scale Steam Turbines." The actual contents will be arranged at the annual meeting.

2. Preliminary Ideas on Institution Work During the 1983-1985 Period

After discussions at the meeting, it was proposed that the "preliminary ideas for the Power Engineering Institution in the 1983-1985 period be

revised and supplemented and that preliminary arrangements be made on the academic activities of the various specialized committees for the next few years.

3. Preparations For Holding the Fourth Annual Meeting

The council seriously considered the "views on holding the fourth annual meeting of the Power Engineering Institution." They also revised and supplemented the central topics for discussion, arrangements for the main contents as well as the method for collecting and appraising papers at the fourth annual meeting.

Discussions at the meeting determined that the central topics for discussion at the fourth annual meeting would be: the perfection of Chinese-built units (including thermoelectric and hydroelectric units), the energy conservation of thermal energy and power equipment, and the transformation to and use of nuclear energy and new sources of energy. The fourth annual meeting will sum up China's scientific research achievements and experiences in the field of power engineering since the third annual meeting, and investigate the scientific and technological policies, direction of development and focal points for present and future work.

The council agreed that the main contents of the fourth annual meeting will be: academic exchange and discussions of special topics, new elections for the council, to commend the institution's activists, to determine ideas for the work of the institution during the 1983-1985 period and to organize and build up editing and publishing work.

The meeting discussed and revised the means of soliciting and appraising articles for the fourth annual meeting of the Power Engineering Institution. They also agreed that the fourth annual meeting be held quarterly in 1982.

4. Editing and Publishing

During the meeting, the institution's editing and publishing committee held an enlarged conference where they reviewed and summed up the editing and publishing work done since the third annual meeting. They also listened to work reports from the editorial department of the institution's journal "Power Engineering" and discussed the policies, plans and organization of editing and publishing as well as the sources of manuscripts and the setting up of a communications network. Finally, a comprehensive report was presented to the entire council meeting.

5. Organizational Construction and Other Matters

This council also discussed the organizational construction of specialized committees, the organization members and how to succeed in secretarial work. There were identical views on these problems.

Finally, the meeting hoped that each specialized committee would make the be best use of their time and vigorously prepare by first accomplishing the various specialized academic activities in 1982 and holding the fourth annual meeting. At the same time, they must further consider ideas for the organization during the 1983-1985 period so that organization activities will better serve the building of the four modernizations and further promote the development of power engineering undertakings.

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TWO COMPUTER SERVICE FIRMS ESTABLISHED IN CHENGDU

Chengdu SICHUAN RIBAO in Chinese 18 May 82 p 1

[Article by Wang Tong [3769 1749] and Yan Weipian [0917 3634 7478]: "Sichuan Branch of the China Computer Technology Service Compnay, Sichuan Provincial Computer Technology Popularization and Service Company Are Established in Chengdu"]

[Text] With approval by the State Computer Industry Bureau and the leading departments of the Sichuan Provincial Government, the Sichuan branch of the China Computer Technology Service Company and the Sichuan Provincial Computer Technology Popularization and Service Company were officially founded in Chengdu on May 15.

These two companies are enterprises jointly managed by related departments of our province and related departments of the Central Government. They are also one of the points of the key computer technology service network throughout the nation. Their establishment will better promote the popularization and application of computer technology in the various sectors of the national economy in our province and in the neighboring regions.

These two companies in the province are also a joint body. At present, besides the headquarters of the companies, the Chengdu City Computer Service Company has joined the Emei Radio Plant. In the future, along with the application and development of computer technology, more units will be organized and joined together.

These two companies are under the joint leadership of the China Computer Technology Service Company and the Sichuan Provincial Fourth Machinery Industry Bureau. The companies operate independently and practice independent accounting. Their main services include the development of computer technology, its popularization and application and technical services.

Secretary of the Provincial Committee He Haoju [0149 6787 3515], Deputy Governor of the Provincial People's Government Liu Haiquan [0491 3189 3123], responsible comrades and delegates from related departments of the Ministry of Electronics Industry, the Computer Industry Bureau, and the China Computer Technology and Service Company attended the founding ceremony of the two companies. Deputy Governor Liu Haiquan spoke at the ceremony.

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CSO: 4008/181

ARTICLE REPORTS ON USE OF ELECTRONIC COMPUTER TECHNOLOGY

Chengdu SICHUAN RIBAO in Chinese 16 May 82 p 1

[Article by reporters Wen Xianshu [2429 6343 2579] and Yan Weipian [0917 3634 7478]: "Some Enterprises in Our Province Have Begun to Use Computer Technology, Better Achievements have Been Realized in Promoting Technical Reform, Increasing Production and Elevating Management Standards"]

[Text] The Sichuan branch of the China Computer Technology and Service Company and the Sichuan Provincial Computer Technology Popularization and Service Company carried out the spirit of making preparations to establish themselves and providing services simultaneously, actively launched the work of applying and popularizing computer technology and providing services. They have realized better results.

The computer is a high speed computational tool. It is also an economical information management system. Its scope of application is very broad. Especially today when modern science and technology are rapidly developing, it is an indispensable and important means to promote technical improvement of the various sectors of the national economy and the progress in the development of building the four modernizations. Since the second half of last year, they cooperated with some enterprises in the metallurgical profession, machinery profession, textile profession, timber profession, and electric power profession to popularize and apply this new technology. This has visibly served to improve the level of production and management of these enterprises. Take the Chengdu Log Storage Yard as an example. With the help of the companies' member unit, the Emei Radio Plant, this log storage yard used the computer to automatically control inspection and measurement of logs so that processing logs from the mouth of the river to measuring, calculation of the volume of timber, and the classificiation of timber were all automatically controlled. This not only increased the accuracy of inspection and measurement greatly, it also greatly reduced the workers' labor intensity. Now, people can see at the site that regardless of the specifications of size and length of the timber, its volume can be accurately calculated and obtained in an instant while the logs are run through the computerized and automated control system for inspecting and measuring timber. According to measurements by the yard, because the computer was used to inspect and to measure logs, the error rate in inspection and measurement of timber has dropped from the original 10 percent to 3 percent.

Calculating at the rate of storing 500,000 cubic meters of timber a year at the yard, the annual error can be reduced by 35,000 cubic meters. Again, for example, one of the founding members of these companies--the Chengdu City Electronics Research Institute--cooperated with the Fourth Subsidiary Plant of the Changjiang Steel Mill. According to the currently available equipment and production technology at the Fourth Subsidiary Plant of the Changjiang Steel Mill, a system for automatically reporting the results of pre-furnace analysis of steel samples was developed. The system was connected to the original E600 model direct reading spectral analyser in operation. Besides completing the entire process of analyzing steel samples, the results of analysis of steel samples were printed out before the steel entered the smelting furnace. Automated reporting of the results of analysis of steel samples before entering the furnace was realized. The reliability of the measured data of the original simulator equipped with the E600 direct reading spectrograph was poor. The computational speed was slow. The consistency of the same data was poor. After using a digitizer, the reliability of the measured data was high, the speed was fast and consistency was good. The results were more visible especially when this system was used in place of manual inspection of the curves. The improved speed of computation and the printout of the results of analysis before entering the furnace shortened the time of smelting steel of each furnace by 15 minutes and in this way, 13,500 kilowatt-hours of electricity could be saved a day. Because the reports were in time, visible results were obtained in guaranteeing the quality of the steel and reducing the consumption of raw materials. During the period of preparation of these two companies, four learning classes were held in response to the demand of users and they trained more than 200 technicians for the users. The classes were deeply welcomed by the users.

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CSO: 4008/181

APPLIED SCIENCES

INTRODUCING NEW TYPE OF INDUSTRIAL HIGH PRESSURE VESSEL

Hangzhou ZHEJIANG DAXUE XUEBAO [JOURNAL OF ZHEJIANG UNIVERSITY] in Chinese No 1, Mar 82 pp 84-89

[Article by Zhu Guohui [2612 0948 6540]: "A New Type of High Pressure Vessel of Wound Flat Steel Ribbons With a Thin Inner Tube"]

[Text] Abstract

High pressure vessels are widely used in the chemical industry, petroleum industry, atomic energy industry and other industries.

Because the body of ordinary high pressure vesels is long, the diameter is large, the wall of the vessel is thick and the vessel must be safe and reliable in use, it is very difficult to manufacture. This article introduces a "new type of high pressure vessel with wound flat steel ribbons and a thin inner tube." The vessel is rationally structured, simple to manufacture, highly efficient, low cost and safe to use. At present, over 3,000 of this new wound ribbon type high pressure vessel with a diameter of ϕ450 to ϕ1,000 millimeters and that can sustain a pressure of 150 to 320 kilograms/square centimeters have been successfully used in our nation.

I. Introduction

High pressure vessels are widely used in modern industry and technology [1][2]. For example, the ammonia synthesis tower, the urea synthesis tower, the methanol synthesis tower, petroleum and coal hydrogenation facilities, vessels for the atomic reactor, energy storage vessels for large hydraulic press and containers for artificial gems are all precious and key pieces of equipment in modern industry and technology.

Because of the trend of development towards largeness in such industries as chemical engineering, petroleum and atomic energy, larger and larger inner diameters, lengths and wall thickness of high pressure vessels are required.

The inner diameter of some vessels can reach ϕ4,000 millimeters, the lengths can reach 40 meters, the thickness of the wall can reach 300 millimeters and the weight can reach over 300 tons. This has presented unusual difficulties in manufacturing [3].

The first high pressure vessels--the barrels--were cast in a lying position. But high pressure vessels used in the ammonia synthesis industry were cast in whole from the beginning. This was because casting easily caused crumbling type explosions. But whole body cast high pressure vessels required large hydraulic presses of the 10,000-ton class, large lathes and boring lathes, and large heat treatment furnaces. The manufacturing technology must be high and the amount of cutting and processing was very large. The efficiency was low, the cost was high and manufacturing was difficult. This prompted people to find out whether steel plates could be made into a relatively thin outer surface of inner tubes and whether they could be encased by hot outer tubes, and even whether steel ribbons or steel mesh could be wound into high pressure vessels. But, the high pressure vessels with both ends sealed must bear the axial force of internal pressure and they required that the thickness of the inner tube should not be smaller than half the total thickness of the container, therefore, placing an inner tube with a thickness less than half the total thickness of the container inside a hot hoop tube or winding ordinary steel ribbons on the outside would not produce rational high pressure vessels. This resulted in the emergence of the "vessel with a thick inner tube of wound ribbon" [4] and the "vessel with a thick inner hoop tube." But these two types of high pressure vessels with "thick inner tubes" could not be made from ordinary steel plates because the inner tube was still too thick. Frequently, they were still very difficult to manufacture. Thus, a development trend in two other directions emerged later: One direction continued to reduce the thickness of the inner tube and thus the two types of high pressure vessels of the famous "framed threat wound" type and "formed ribbon clipping" to bear the axial force of internal pressure. The other direction of development was to manufacture high pressure vessels by welding together several tube segments of shorter lengths. A technique of "welding thick rings at the seams" using single layer or multiple layer thick walled tube segments to form a sufficiently long high pressure vessel was developed to bear the axial force on the end caps. This produced the "forge welded type," "thick rolled plate welded type," "multiple layer wrapped type," "tube segment wound plate type," "spiral wrapped type," "multiple layer hot cased type" [6] high pressure vessels. The "formed trough wound ribbon type" and the "multiple layer hot cased type" are the two types of high pressure vessels widely used in Europe and the United States at present.

But, regardless of whether it is "formed ribbon clipping" or "thick rings welded at the seams," they still require special and difficult technology because of the following:

When using "formed ribbon clipping " (See diagram 1a):

1. The exterior wall of the inner tube requires the use of especially large (reaching 50 meters long) lathes to process the tube into a concave and convex trough that can bear the axial force. Its manufacturing techniques are relatively difficult.

2. The requirements of the technique of binding special steel ribbons with a section of three or five troughs are very high.

3. The requirements for "clipping" the wound layers are strict, and unidirectional winding will cause the inner tube to "un-clip" due to twisting, and finally, the axial force in the inner tube will be too large and the tube will break.

4. The thickness of the inner tube made by unidirectional winding of steel ribbons is thin and the lateral rigidity of the vessel is relatively weak.

When using "thick rings welded at the seams" (See Diagram 1b):

1. Large specialized end surface processing machine tools are needed to process the slanted lips of the ring seam for welding each of the thick walled tube segments.

2. When welding a large number of thick, narrow and deep rings at the seams, the welding technique itself is an especially difficult technique. Defects such as cracked seams, the presence of impurities and not welding through the material easily occur and a large amount of welding rods and electricity must be used.

3. Non-destructive inspection of defects of deep trough ring seams is also a difficult technique not only because the thickness creates difficulties for inspecting the defects but also because one ring seam has to be moved and transported back and forth and inspected many times to avoid overlooking any defects during inspection and repairs are difficult.

4. Welding thick rings at the seams produces a "waist hoop" in the vessel causing sudden changes in stress in multiple layer vessels. Cracks in the welded seams and such defects may enlarge in single layer welded ring seams and cause low stress breaking.

Therefore, for many years, the direction of international research in high pressure vessels has been to improve and eliminate "formed ribbon clipping" and "welding of thick rings at the seams," to simplify manufacturing techniques, to improve the degree of mechanization of the manufacturing process, to reduce the requirements for raw materials, to avoid hidden defects of large cracks, and to guarantee safety and reliability in use.

Aimed at the above situation, the Soviet Union successfully developed a type of "high pressure vessels of spiral wound plates" in 1978 and planned to develop large diameter high pressure vessels [7]. The width of the plate was between 1,000 and 1,500 millimeters. Each layer was wound from a single head and the angle of inclination was about 10° to 15°. Here, it is worth using large and strong rolling lathes and difficult end processing techniques to eliminate "formed ribbon clipping" and "welding thick rings at the seams." The fact that such wide steel plates have to be rolled layer by layer and several wound plates have to be welded together to increase the axial strength of the vessel is sufficient to show that the problems existing internationally in the manufacturing of high pressure vessels at present are still very serious.

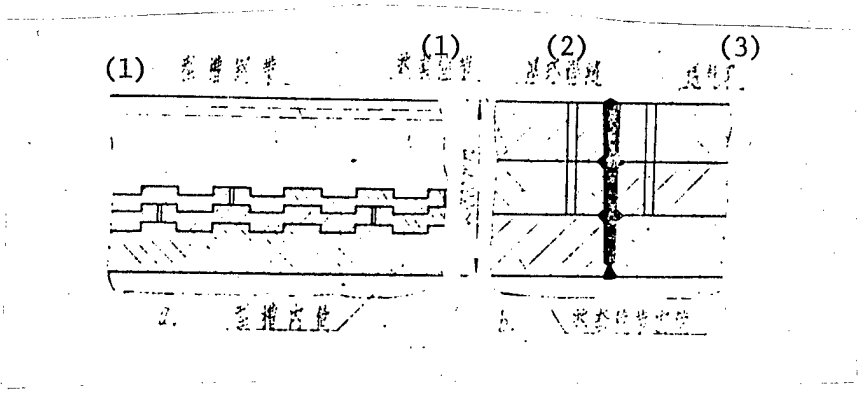

Diagram 1 "Formed ribbon clipping" and "thick rings welded at the seams"

a. Formed trough inner tube

1. Formed trough steel ribbons

b. Inner tube of hot cased tube segment

1. Hot cased tube segment
2. Thick ring welded at the seams
3. Air hole

II. Basic Structure and Main Characteristics of the New Type of Wound Ribbon Vessels

The structural principle of this new type of wound ribbon high pressure vessel of our nation was proposed in 1964. It was tested in our school's chemical machinery laboratory [8]. Later, under the guidance and support of the director of the original Hangzhou Boiler Plant and national model worker Chen Yousheng [7115 2589 3932], director of the original General Machinery Research Institute of the First Ministry of Machine Building Su Youquan [5685 0642 3123] and our school's Professor Wang Rendong [3769 0117 2639], our school cooperated separately with the Hangzhou Boiler Plant, the General Machinery Research Institute of the First Ministry of Machine Building and the Nanjing Second Chemical Machinery Plant to develop industrial products. Success was achieved in 1965 one after the other. Then, the products were rapidly popularized and applied in our nation. Up to now, there are 10 factories in the nation producing various types of high pressure vessels and more than 3,000 have been used throughout the nation. They have brought visible technical and economic results to the nation. Their design received the third class invention award by the Inventions Evaluation Committee of the State Scientific and Technological Commission on January 30, 1981.

Basic Structure:

This type of vessel consists of a thin inner tube, a tube flange and bottom cap and a layer of flat wound steel ribbons (See illustration in Diagram 2). The thickness of the inner tube is 20 to 25 percent the total thickness of the vessel, the thinnest can be 10 percent and the thickness can vary within

a relatively large range. The manufacture of the inner tube is the same as that of ordinary medium and low pressure vessels, but its quality requirements are higher. The flanges at the ends are usually forged. They can also be multiple layer flanges. The bottom cap can be punched into a spherical shape using single layer or multiple layer steel plates. They are all made with a 30° to 40° taper to enable the top and bottom ends of the steel ribbons to be welded together. The width of the flat steel ribbons has various specifications from 20 to 200 millimeters and the thickness has various specifications from 2 to 8 millimeters. The flat steel ribbons are wound on the outside of the the inner tube by a special structural principle using the cold winding method or hot winding method. To protect the steel ribbons from rain, a thin protective plate of 1 to 2 millimeters thick is wrapped on the outside of the final wound ribbon layer.

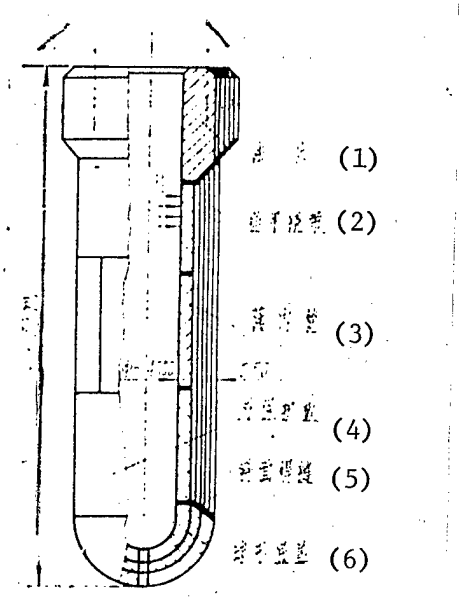

图 2　新型绕带高压容器示图

Diagram 2 Illustration of the new wound ribbon high pressure vessel

1 Flanges 2 Flat wound ribbon 3 Thin inner tube 4 Protective plate
5 Slanted surface of welded seam 6 Spherical end cap

(I) Manufacturing Characteristics:

Because of the following reasons, the production efficiency of the new wound ribbon high pressure vessel can be visibly improved, the manufacturing cost can be greatly lowered, and these characteristics can be used to manufacture large diameter and ultrahigh pressure vessels:

1. The thickness of the inner tube constitutes only 10 to 25 percent of the total thickness of the vessel. Manufacturing has been greatly simplified. Steel plates of ordinary thickness are suitable for the needs in manufacturing large sized high pressure vessels.

2. Most of the raw materials used are flat steel ribbons that are easily bound and that are low cost. Regardless of the diameter and the thickness of the wall of the vessel, all of the raw materials are suitable.

3. The wound ribbon layers only have to be close together without being "clipped" together. In this way, the thickness of the wound layers can be thicker than that of formed trough wound ribbon containers. This also completely eliminates processing formed troughs of the inner tube on large lathes.

4. Most of the thickness of the vessel consists of wound ribbon layers, therefore, the amount of work in massive welding, inspection of defects and hot processing is reduced. In particular, it avoids welding thick rings at the seams and hot processing the whole piece. The consumption of welding rods, electricity and transparent film can be reduced by 80 percent.

5. The winding of steel ribbons can be realized using a simple ribbon winding facility. As long as the facility is equipped with appropriate tools to weld, buff and pack the steel ribbons, the winding quality of the steel ribbons can be more easily guaranteed, and the steel ribbon winding device can have a higher efficiency. The manufacturing process is basically to add the steel ribbon winding procedure to the manufacturing of the inner tube. Thus when winding of the steel ribbons has been completed, the vessel is basically completed. There are few procedures and the manufacturing period is short.

When compared to the three-layer hot cased vessel [9] [10] believed internationally to be more advanced at present, the production efficiency of the new wound ribbon vessel can be improved by more than onefold and the cost can be lowered by 30 to 40 percent. The economic result is very visible and our vessel is more suitable for enlargement compared to the vessels of spiral wound plates of the Soviet Union.

(II) Strength Characteristics:

Many tests were conducted with this type of wound rigbon vessels with an inner diameter of Φ40 to ϕ100 millimeters and a designed pressure of 150 to 320 kilograms/square centimeters. The results showed:

1. The explosion pressures of the vessels all reached over 3 times the internal working prssure with the highest reaching 2,140 kilograms/square centimeters, and because the rate of utilization of materials was improved, the consumption of steel materials was about 20 percent less than that of the multiple layer wrapped vessels.

2. The axial strength of the vessels was sufficient, i.e., the thickness of the inner tube constituted only 15 percent of the total thickness of the

vessel. Also, axial breaking like that which occurred at the time of explosion of the formed trough wound ribbon vessel did not occur. For example, a new type of wound ribbon vessel used in production at present has an inner diameter of ϕ60 centimeters. The thickness of the inner tube is 1.6 centimeters. The vessel has a total of 14 wound layers of flat steel ribbons. The thickness of the wound layer is 5.6 centimeters. The allowable stress of the steel ribbons $[\sigma_w]$=1,700 kilogram/swuare centimeters, and the internal working pressure P_i =320 kilograms/square centimter. At this time, the axial load of this type of wound vessel is:

$$P_i' = \frac{2 \cdot Y_{wm} \cdot S_w \cdot Q \cdot [\sigma_w]}{} = \frac{2 \times 34.6 \times 5.6 \times 0.5 \times 1700}{30^2} = 365$$

kilograms/centimeter > P_i ,

i.e., the wound ribbon layers alone can bear all of the axial force of the internal pressure of the vessel. In the formula, Q is the coefficient of force that can be borne axially by the wound ribbon layers calculated theoretically and experimentally measured.

3. Success has also been achieved by drilling holes in the wall of this type of vessel to connect pipes. A hole of ϕ260 millimeters was drilled on a vessel of this type with an inner diameter of ϕ500 millimeters. After 200 hydraulic pressures tests, we found that its explosion pressure still reached 1,140 kilograms/square centimeters (the internal working pressure was 320 kilograms/square centimeters).

4. Because pre-stressed winding of steel ribbons will cause the inner tube to contract circumferentially and axially, the circumferential contraction can reach 0.1 to 0.15 percent of the inner diameter di of the vessel. This is equivalent to the excess in fit of the unprocessed hot cased vessel. Axial contraction can also reach 0.1 percent of the length of the vessel. After winding 12 layers of steel ribbons of a wound ribbon vessel of this type with an inner diameter of 500 millimeters and a length of 1.6 meters, the inner diameter shrinks an average of more than 0.6 millimeters and the length shortens 1.69 millimeters. When the interior is pressurized to 400 kilograms/square centimeters, the axial length of the vessel will be restored to only 1.63 millimeters and there is still a contraction of 0.06 millimeters. This shows that even under excess working pressure, the axial length of the inner tube is still compressed somewhat while the external layer of steel ribbons still has a safety margin established by the designed standards. Based on this situation, we have proposed a "low stree inner tube" design [11] for this type of wound ribbon vessels so that the circumferential and axial lengths of the inner tube will basically not bear tensile stress under working pressures. This type of high pressure vessel with an inner tube that "does not open" is being sought by international efforts. It is not difficult to realize with this new type of wound ribbon vessels.

(III) Safety Characteristics

The new type of wound ribbon vessel has the following outstanding structural characteristics [12] in guaranteeing safety in use:

1. The inner tube is thin: This is the key part of the vessel bearing internal pressure. Because it is thin and easy to manufacture, the quality is more easily guaranteed. There are few hidden defects. And it can be treated by pre-stressed winding or excess strain [13] so that the circumferential and axial lengths are compressed beforehand. This is beneficial to preventing the enlargement of cracks.

2. The steel ribbons are thin: This is an important indicator of superior quality material. Because the thickness of the flat steel ribbons is only 2 to 8 millimeters, the vessel possesses the properties of good metallic fibers. The quality of the material is more reliable, and the temperature that induces a change in brittleness is lower, the toughness in breaking is improved, and crumbling type fragments can be completely avoided.

3. There are many layers: This is the key factor preventing the vessel from exploding due to brittleness. Because the thickness of the vessel consists of many layers of thin sections and because there are no welded seams of thick rings along the entire length, the gaps between layers serve to "stop cracks." The wound layers also provide full protection of the inner tube, therefore, under internal working pressures, this type of vessels will not explode in whole due to low stress brittleness.

4. The two ends are slanted and scattered welded seams: This is an effective measure to prevent the flanges or the bottom cap from breaking and flying out and causing serious incidents. This is because, when the deep and thick ring seams are changed to slanted and scattered welded seams (Diagram 3), the area of the welded seams under force is increased so that welding is greatly simplified. Also, because the structure of the welded seam has been changed, even if point a of the ring seam of the inner tube breaks, the slanted surface of the welded seam at point b of the wound ribbon layer will not immediately enlarge the crack and cause the cap to fly apart.

5. The wound ribbon layers have many natural warning "air holes": This provides natural conditions to release air, depressurize the vessel and prevent explosion. Because the winding process of this type of wound ribbon vessel can form natural bends as air release channels, these channels are not only beneficial to releasing and removing hydrogen and reducing erosion by hydrogen, they also provide very favorable conditions for releasing air and depressurization and prevent the vessel from exploding as a whole.

Theoretical analysis and practice all prove that this type of wound ribbon vessel can completely avoid sudden explosions due to brittleness under normal operating conditions.

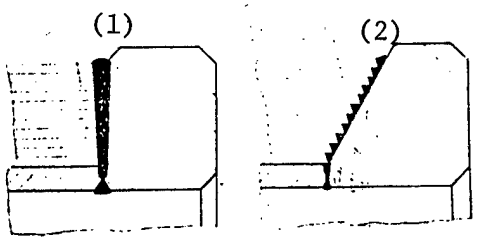

图 3　厚环焊缝与斜面分散焊缝

Diagram 3 Thick ring welded seam and slanted and scattered welded seam

1 Multiple layer warpping 2 Flat wound ribbon

III. Future for the Development of New Types of Wound Ribbon Vessels

According to reports, the formed trough wound ribbon high pressure vessel developed by West Germany has an inner diameter of ϕ3,500 millimeters, a length of 40 meters, a wall thickness of 300 millimeters, a working temperature of 350°C, an internal working pressure of 3,000 kilograms/square centimeters and a weight of more than 300 tons [14].

According to the characteristics of our nation's new wound ribbon vessel described above and compared to the West German formed trough wound ribbon vessel, the new wound ribbon vessels will develop in the following aspects:

1. They will be used in manufacturing large diameter high pressure vessels:

Because the required thickness of the inner tube of the new wound ribbon vessel is thinner than that of the formed trough wound ribbon vessel while the winding of flat steel ribbons is much simpler than that for formed trough steel ribbons and spiral wound plates, as long as a large and simple winding lathe can be fitted (simpler than the lathe for the spiral wound plates and with less power), various types of large high pressure vessels can be wound.

2. They can be used in manufacturing ultrahigh pressure vessels:

Because the layers of the new wound ribbon vessels do not need to be "clipped together" but only placed close to each other, thus, according to the past practice of winding 28 layers of steel ribbons, the ribbon winding machine tools currently available need only slight modifications to manufacture various types of thick vessels of less than 30 layers but can sustain ultrahigh pressures, such as high temperature equal static pressure vessels.

3. They can be used to manufacture special high temperature, low temperature, anti-erosion and anti-radiation vessels:

Because the new wound ribbon vessel consists of many layers, the materials for the internal and external layers and between layers can be changed according to requirements, and the inner tube can be thinner (still possessing better rigidity), therefore they can be more easily adapted to high temperature, low temperature and anti-erosion requirements, such as the high pressure and high temperature vessels used in manufacturing petroleum and for coal hydrogenation reactions.

4. They can be used to manufacture various types of pressure vessels or gas bottles of fixed shapes that do not require opening large holes in the walls and that require a relatively fixed wall thickness to improve the safety and reliability of high pressure vessels.

Because the new wound ribbon vessel is a type of truly multiple layer composite vessel, its manufacture is not only simple, there are less hidden defects, the gaps between layers can prevent cracking, the outer layer can serve a protective function, therefore, it is possible for the pressure vessel to "leak but not explode" under operating pressures and avoid possible serious consequences due to explosion caused by low stress brittleness. This can gradually change people's fear of pressure vessels and especially high pressure vessels.

In summary, this type of new wound ribbon vessel of our nation still has many problems that need to be studied in depth, solved and perfected in theory and in practice. Its future for development in the international arena will gradually manifest itself before us!

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APPLIED SCIENCES

CHINESE HUMAN DIMENSIONS, THEIR APPLICATION IN DESIGN OF MOTOR VEHICLES

Changchun QICHE JISHU [AUTOMOBILE TECHNOLOGY] in Chinese No 2, 1982
pp 54-60

[Article by Wang Qiyuan [3769 6386 3293], Qi Huiwen [7871 1920 2429] of the Changchun Motor Vehicle Research Institute: "Physical Dimensions of the Chinese and Their Use in Automobile Designs (Part II)--Brief Introduction to the Dimensions of the Operating Position of the Driver of the JB2667-80 Truck"]

[Text] 5. The Concept of the "Standard Human Body" and the Application of Human Physical Dimensions

When we established the interior dimensions (preliminary design stage) of the driver's cab in the past, we used a 1:5 "standard human body" as the model for measurements to examine whether the dimensions of the operating space of the driver were appropriate. Now it seems that using this method of arrangement does not take into consideration the overall situation. For example, if we use the average "sitting height" to determine the dimension between the cushion of the seat and the roof, 50 percent of the people with physical dimensions larger than the average values will feel there is insufficient head room between the top of the head and the roof. Also for example, if we use the average height of the bend of the leg to design the height of the seat and cushion, then 50 percent of the people with physical dimensions smaller than the average values will not be comfortable because their feet cannot reach the floor and there will be too much pressure against the underside of the thighs, and these drivers will quickly become tired and their legs will become numb.

The arithmetic averages calculated from measurements are used only to explain the trend of concentration of one dimension. Actually, a "standard human body" completely possessing average dimensions does not exist. The possibility that a person possesses several average dimensions is very small. This can be explained by using the dimensions of men measured as an example:

Among the 864 people measured, the height of only 168 people generally coincided with the average height (1,675 to 1,700 millimeters), constituting

19.45 percent of the total, Among these 168 people, only 70 persons had a seated height generally coinciding with the average (885 to 905 millimeters), constituting 8.1 percent. Among these 70 persons, there were only 20 people with an outstretched upper arm length coinciding with the average (830 to 845 millimeters), constituting 2.32 percent of the total. Among these 20 persons, only 10 had an upper arm length generally coinciding with the average (265 to 275 millimeters), constituting 1.16 percent of the total. Among these 10 people, only 2 people had an outstretched lower limb length generally coinciding with the average (1,010 to 1,025 millimeters), constituting 0.232 percent of the total. Between these two people, the width of the buttocks of only one generally coincided with the average (325 to 340 millimeters), constituting 0.116 percent.

Thus it can be seen that a person who has four physical dimensions coinciding simultaneously with the average dimensions is a "rare find within a hundred 1i." This does not have any meaning in practical application. The probability of a person simultaneously having six physical dimensions coinciding with the average dimensions is one in one thousand. This says, the "standard human body" with all dimensions coinciding with the average dimensions actually does not exist.

Then, what is the meaning of the various average dimensions of the human body measured here? It has already been proven previously that the dimensions of the human body show a normal distribution, and their density function is as shown in Diagram 3. The μ , σ we measured have a clear meaning in probability. The value of σ represents the degree of scattering of the distribution. The greater the σ, the greater the degree of scattering. The Gaussian curve is flat. The smaller the σ, the more pointed the curve. The μ represents the location of concentration of distribution. The density is the largest near μ . We know from the characteristics of normal probability that 95.6 percent are distributed between -2σ and $+2\sigma$.

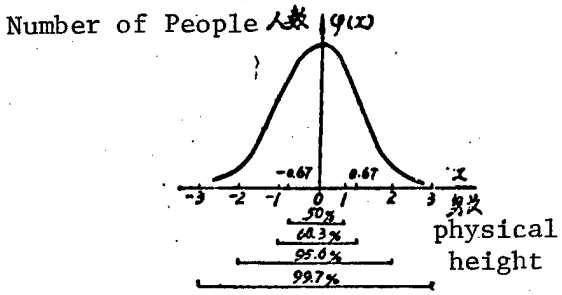

Diagram 3 Normal distribution of the height of the human body

Therefore, it is a mistake to take the arithmetic averages as the basis for designing human physical space. The average values must be used jointly with the standard deviation σ --which explains the degree of scattering before the average values can represent the dimensions of the human body of the majority.

Take the body length that we measured as an example, the average μ of the body length of men was 1,688.25 millimeters, the standard deviation was 81.83 millimeters. When we take (μ -1.645 σ) to (μ + 1.645σ), i.e., from 1,550 to 1,820 millimeters, the men with dimensions within this interval constitute 90 percent of the total number of men.

Because the traffic control departments of each province have ruled that the height of the driver must not be less than 1,550 millimeters, therefore the lower limit of height of women need not be considered while the upper limit of height of women is less than 1,820 milimeters. Therefore, when designing the body of the vehicle, it is sufficient to consider only those people with a height between 1,550 and 1,820 millimeters.

6. Foreign Ergonomics

Foreign nations have special groups to study human physical dimensions, weight, physiology and their relationship to driving operations and a lot of research and measurements have been done. For example, the ergonomics group of Boeing Company of the United States and the SAE human model group have since 1944 conducted broad human physical measurements and surveys of American military personnel. The most recent survey was conducted by the U.S. Department of Health in 1960-1962. A total of 6,672 American adults between the ages of 18 and 79 were selected by race, geographical origin, social origin, economic status to represent non-military personnel. They were measured according to various criteria and the percentages were computed by computer. In the United States, the measurement of human physical dimensions is done very thoroughly. For example, there are: dimensions of the joints of the human body, exterior dimensions, dimensions when wearing clothes, dimensions added to the person in cold areas, and even down to the dimensions of the top hat, the straw hat, ordinary shoes, women's high heels, etc. The weight of the physical body is also finely measured. The weight of the human body is further divided into the weight of the head, the chest, the stomach, the upper arm, the lower arm, the hand, the thigh, the shank and the foot. They all have specific weight measurements. These are measured for making three-dimensional models of the human body and for determining the weight distribution of dummies used in collision tests.

In recent years, the question of how to coordinate the relationship between machine and man has attracted the attention of various nations. Because all machines and equipment must be operated by people and must serve people, therefore the application of research results of "ergonomics" will help improve man's working conditions and improve the efficiency of machines. Therefore, major industrial nations of the world today have all established Human Engineering Societies to see to it that engineering designs and standards coincide with the requirements of human engineering. For example, Britain and West Germany have reviewed the standards established in the past according to the requirements of human engineering.

Besides the establishment of human engineering societies in foreign nations, the International Standards Organization (ISO) has especially established a

new technical committee--Human Engineering Committee (ISO-TC159) to especially study the problems of standards in human engineering.

The Road Vehicle Technical Committee (ISO/TC22) also has a subcommittee (SC13) for the "application of human engineering in road vehicles." The subcommittee has many subordinate working groups (WG) engaged in studying the application of human engineering in road vehicles and drawing up related standards.

II. Dimensions of the Operating Position of the Truck Driver

1. General Description

In recent years, as high speed highways are built, as the speed of vehicles increase, the efficiency of automobile transportation has visibly improved. In special transport companies, drivers spend most of the time inside the driver's cab. While driving, the driver must frequently observe the road surface, reduce speed, change gears and operate various manual switches. Therefore, how to enable the driver to sit comfortably while driving at high speed and while working for long hours, save his strength in operating the vehicle and reduce fatigue are very important to safe driving.

At present, every nation has paid special attention to the arrangement of the position of the driver's seat and the various types of operating mechanisms in trucks. A lot of progress has been made in improving comfort. For example:

(1) There is the use of the "suspension seat," i.e., the back and the cushion are made into a whole. At the bottom of the seat are installed springs and shock absorbers. This way, there is no positional shift between the back and the seat cushion and thus "rubbing the back" is eliminated. On the other hand, while driving on roads of poor condition, the amplitude produced by the seat can quickly dissipate.

(2) There is the use of the "bucket seat" that coincides with the shape of the human body. The angle of the seat cushion and the back can all be adjusted, thus increasing the seat's support of the human body and improving the comfort of the ride. Bucket seats can also eliminate the sideways sliding of the driver when driving on winding roads.

(3) Some seats have head rests and the angle of the head rests can be adjusted to reduce muscular fatigue of the neck while driving long distance. The head rests also prevent the neck from damage in "tailing" accidents.

(4) The steering wheel of the Japanese "Fukuha" FK series trucks can be adjusted within a range of $\pm 3°$ to adapt to the operation of different drivers.

(5) Some manually operated buttons are arranged so that they can be easily reached, and necessary and bright warning lights have been installed

on the instrument panel, thus reducing the driver's physical and mental fatigue.

In general, efforts should be made to appropriately arrange the position of the driving mechanisms so that operation of the vehicle takes less effort and the ride is comfortable. These efforts will improve safety in driving.

2. The Relationship Between Human Body Engineering and the Arrangement of the Driver's Cab

The driver's cab is the place where the driver operates the vehicle and rests, therefore, to arrange the interior of the driver's cab rationally, we must understand the dimensions of the various parts of the human body, especially the distances between the joints and the area of activity of the four limbs.

The arrangement of the interior dimensions of the driver's cab is centered around the activity of the driver. We should start out from maneuverability, comfort and safety and develop a design that suits the whole arrangement of the entire vehicle. Rational arrangement enables the driver to sit comfortably, to maneuver easily and to have a good view. This will keep the driver from feeling tired in long distance driving, improve traveling speed and reduce the occurrence of accidents.

The basic consideration for the arrangement of the interior dimensions of the driver's cab is the sitting position of the driver in the seat. The sitting position is determined by the use and the type of the vehicle.

In large trucks, the so-called "upright sitting position" is used a lot. The steering wheel is near the horizontal position. The main consideration is to make it easy to operate and to enable the driver to apply a large force. The reason that reducing the angle of inclination of the steering wheel can increase the force of exertion is that when the angle of inclination of the steering wheel is very small, the lower arm and the upper arm muscles can all participate in maneuvering. When the angle of inclination of the steering wheel is very large, only the muscles of the lower arm can maneuver.

In a sedan, the so-called "comfortable position" is used, i.e., the main consideration is that the driver can sit in this position for long periods without feeling tired.

In the "upright sitting position," the force is the first factor. In the "comfortable position," speed is the first factor. The arrangement of the mechanisms is first determined by considerations for swift and rapid operation (See Diagram 4).

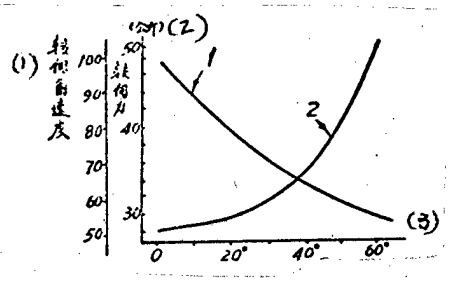

Diagram 4 Angle of inclination of the steering wheel and the angular speed of turning

KEY: (1) Angular speed of turning
(2) Kilogram
(3) Angle of steering column

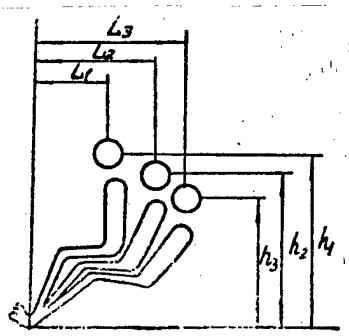

图 5 驾驶员座姿与车身布置的关系

Diagram 5 Relationship between driver's sitting position and arrangement of the body of the car

In flat nosed trucks, because the steering wheel is relatively level, therefore the drivers mostly sit in the "upright position," i.e., the dimensions required in front and in back are smaller while the dimensions in height are larger (See L_1 and h_1 in Diagram 5).

In long nosed trucks, because the steering wheel is more slanted, the drivers mostly sit in the "comfortable position," i.e., the dimensions required in front and in back are larger while the dimensions required in height are smaller (See Diagram 5).

It can be seen that for different models of vehicles, the sitting positions are different and the dimensions of space occupied are also different. But the dimensions of the body of the driver are all the same.

Most of the maneuvers of the driver are performed by the hands and feet. The maneuvers must be correct and they must be able to apply sufficient force. In operation, attention must not be overly distracted thus hindering observation of the road. This is determined to a large degree by the arrangement and structure of the operating mechanisms and the dimensions of the driver's cab and their arrangement.

The arrangement of the operating mechanisms should be within the range of activity of the hands and feet and they should be easily and rapidly within reach. Especially frequently used operating mechanisms should be arranged in the best activity range of the hands and feet. This is very important to shortening the maneuvering time. For example, when driving at 70 kilometers an hour, the vehicle advances about 20 meters per second. Obviously, any design measure that can save 0.1 second will greatly improve safety. For example, in the ISUZU "Fahua" SBR and JBR trucks, the turning light switch, the windshield wiper switch, the light switch, the hand brake are all arranged on the steering column where they can be easily reached.

Diagram 6 and Diagram 7 show the largest and the best operating space for the hands and feet recommended in the SAE J898a of the United States. In the "best" operating space, the operating mechanism can be reached the most rapidly and the most accurately and the operating strength is the greatest. This space is the most ideal. The "largest" operating space is acceptable for operating mechanisms that are not frequently operated and not used for emergencies.

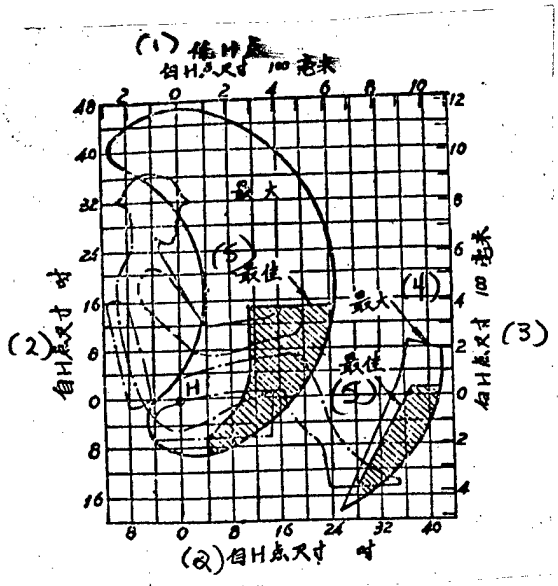

Diagram 6 The best and largest operating space for the hands and feet at low point H [In the diagram, the person represents the physique of 95 percent of relatively tall American males; the seat is in the last adjustable position of the forward and backward adjustments (if 4 inches are allowed for forward and backward adjustment, the best operating space can be provided

for 90 percent of the drivers. Consideration also includes the situation in which the driver is not sitting upright but is slouching by 1 inch).]

KEY: (1) Low point H, dimensions from point H, 100 millimeters
(2) Dimensions from point H, inch
(3) Dimensions from point H, 100 millimeters
(4) Largest
(5) Best

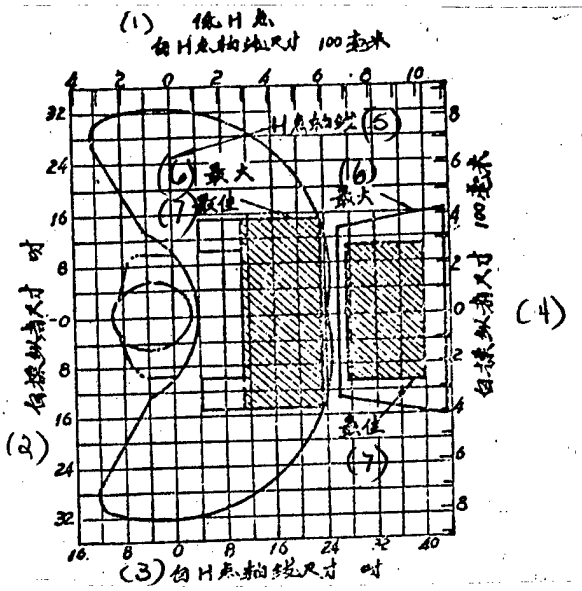

Diagram 7. The best and largest operating space for the hands and feet at low point H (in the diagram, the person represents the physique of 95 percent of relatively large American males; the seat is in the last adjustable position of the forward and backward adjustments; the space for the hands is on the horizontal plane 9 inches above point H).

KEY: (1) Low point H, dimensions of axial line from point H, 100 millimeters
(2) Dimensions from operator, inch
(3) Dimensions of axial line from point H, inch
(4) Dimensions from operator, 100 millimeters
(5) Axial line of point H
(6) Largest
(7) Best

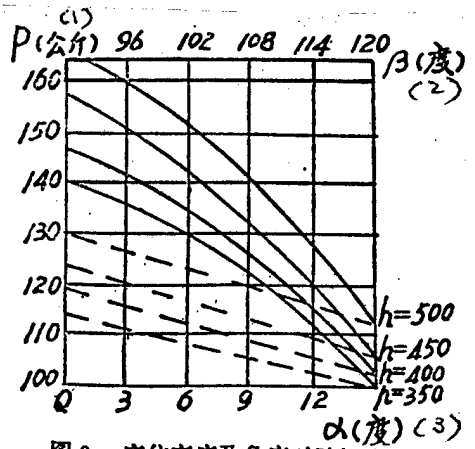

图 8　座位高度及角度对踏板力的影响

Diagram 8 The effect of the height of the seat and the angle upon the force applied to the pedals

KEY: (1) Kilogram
(2) Degree
(3) Degree

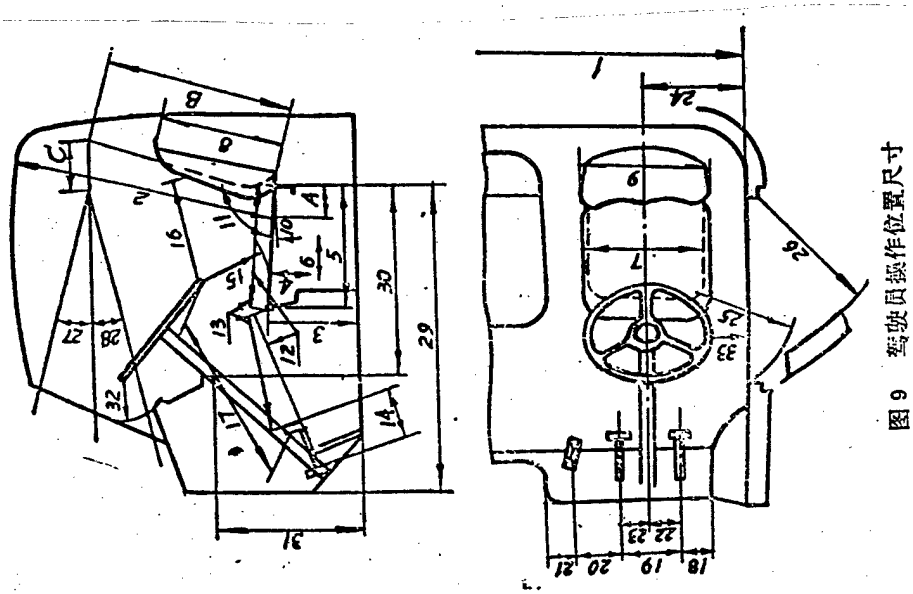

图 9　驾驶员操作位置尺寸

Diagram 9 Dimensions of the driver's operating position

The distance between the floor and the seat and the angle of inclination between the seat and the back of the seat affect the force applied to the pedals.

In Diagram 8: h is the height of the seat cushion from the floor; α is the angle between the seat cushion and the horizontal; β is the angle between the seat cushion and the back of the seat; p is the force that can be applied to the pedals.

We know from Diagram 8: to increase the force applied to the pedals, the seat should be higher while the angle of inclination between the seat cushion and the back should be small.

Visibility is determined by the position, height of the seat and the angle of inclination between the seat cushion and the back should be small.

Visibility is determined by the position, height of the seat and the angle of inclination between the seat cushion and the back of the seat, the dimensions of the front windshield, its shape and its arrangement, the structure of the frame, the hood and the shape and height of the wing panel.

A wide view not only facilitates the driver to observe the road surface, cars, pedestrians and traffic signals, it also improves safety, makes the driver feel comfortable and relaxed and reduces fatigue.

3. Arrangement of the Dimensions of the Operating Position of the Driver

The arrangement of the dimensions of the operating position of the driver is based on the effort to guarantee that the driver can operate normally and can have a rational space. The dimensions of the human body and the range of activity are the basic references for arranging the dimensions of the operating position of the driver.

Diagram 9 marks the items that are ordinarily controlled by the dimensions of interior arrangement of the driver's cab.

Table 5 lists the "recommended values" for the items marked in Diagram 9 according to the human physical dimensions of our nation's people.

To our comrades engaged in designing automobiles, some are familiar to us and they will not be introduced here. The following describes the methods of marking and determining some numerical values and some problems that have been easily overlooked in past designs:

(1) Determination of numerical values

The most fundamental references for determining numberical values are the human physical dimensions of our nation's people. Each dimension in Diagram 9 is based on the "average value" $\gamma \pm 1.645$ times the "standard deviation" σ of the dimension of the corresponding part of the human body.

This means, the dimensions thus obtained coincide with the dimensions of 90 percent of the people in our nation. To the driver, the dimensions coincide 95 percent (because in our nation at present, people shorter than 1,550 millimeters are not allowed to obtain a driver's license). Therefore, the dimensions calculated by this method are unsuitable only for drivers taller than 1,820 millimeters. This is consistent with the physical bodies of the 5 percentage points (short people) and the 95 percentage points (tall persons) of physical measurements used in the United States.

(2) The scope of the numerical values and the method of marking

To suite the various different models of vehicles (flat nosed, long nosed, half protruding head, light vehicles, heavy vehicles....) and the overall arrangement, the numerical value of each dimension has been given a range.

表 5

A 序号	B 项目	C 推荐值(毫米、度)	
1	驾驶室内部宽度	单人座不小于 850 双人座不小于 1250 三人座不小于 1700	(36) (37) (38)
2	座垫上表面至顶棚高	不小于 1000	(39)
3	座垫上表面至地板距离	370±70	
4	座椅上下最小调整范围	±35	
5	座垫深度	420±40	
6	座椅前后最小调整范围	±70	
7	座垫宽度	不小于 450	(39)
8	靠背高度	480±30	
9	靠背宽度	不小于 450	(39)
10	座垫角度（与水平面间）	2°～10°	
11	靠背与座垫夹角	90°～105°	
12	靠背下缘至油门踏板距离	900～1000	
13	靠背下缘至离合器、制动器踏板距离	800～900	
14	离合器、制动器踏板行程	不大于 200	(40)
15	方向盘至座垫上表面距离	不小于 180	(39)
16	方向盘至靠背距离	不小于 350	(39)
17	方向盘至离合器、制动器踏板距离	不小于 600	〃
18	离合器踏板中心至侧壁距离	不小于 80	〃
19	离合器踏板中心至制动器踏板中心距离	不小于 150	
20	制动器踏板中心至油门踏板中心距离	不小于 110	〃
21	油门踏板中心至最近障碍物距离	不小于 60	〃
22	离合器踏板中心至座椅中心面距离	50～150	
23	制动器踏板中心至座椅中心面距离	50～150	
24	座椅中心面至车门后支柱内侧距离	360±30	
25	车门打开时，下部通道宽度	不小于 250	
26	车门打开时，上部通道宽度	不小于 650	
27	上视角	不小于 12°	

28	下视角	不小于 12°
29	靠背下缘至前围距离	不小于 1050
30	靠背下缘至仪表板距离	不小于 650
31	仪表板下缘至地板距离	不小于 550
32	方向盘到前面及下面障碍物最小距离	不小于 80
33	方向盘到侧面障碍物最小距离	不小于 100
34	方向盘中心与座椅中心面偏移量	不大于 40
35	方向盘平面与汽车对称平面之间夹角	90°±5°

Table 5

KEY:

A Order number
B Item
C Recommended values (millimeter, degree)

(1) Interior width of the driver's cab
(2) Height from top surface of seat cushion to roof
(3) Distance from top surface of seat cushion to floor
(4) Smallest upward and downward adjustable range of seat
(5) Depth of seat cushion
(6) Smallest forward and backward adjustable range of seat
(7) Width of seat cushion
(8) Height of seat back
(9) Width of seat back
(10) Angle of seat cushion (between the horizontal)
(11) Angle between seat cushion and seat back
(12) Distance from bottom edge of seat back to gas pedal
(13) Distance from bottom edge of seat back to clutch and brake pedals
(14) Distance of clutch and brake pedals from floor
(15) Distance from steering wheel to top surface of seat cushion
(16) Distance from steering wheel to seat back
(17) Distance from steering wheel to clutch and brake pedals
(18) Distance from center of clutch pedal to side wall
(19) Distance from center of clutch pedal to center of brake pedal
(20) Distance from center of brake pedal to center of gas pedal
(21) Distance from center of gas pedal to nearest obstacle
(22) Distance from center of clutch pedal to center surface of seat
(23) Distance from center of brake pedal to center surface of seat
(24) Distance from center surface of seat to inner wall of the rear support of the car door
(25) Width of bottom passage space when car door is open
(26) Width of top passage space when car door is open
(27) Upper angle of view
(28) Lower angle of view
(29) Distance from bottom edge of seat back to front panel
(30) Distance from bottom edge of seat back to dash board
(31) Distance from bottom edge of dash board to floor

(32) Smallest distance from steering wheel to obstacles in front and below
(33) Smallest distance from steering wheel to obstacles on the side
(34) Shift between the center of steering wheel and center surface of seat
(35) Angle between the plane of the steering wheel and the symmetric plane of the vehicle
(36) Single seat not smaller than 850
(37) Two-person seat not smaller than 1250
(38) Three-person seat not smaller than 1700
(39) Not smaller than
(40) Not larger than

It can be seen from the "recommended values" listed in Table 5 that there are three situations:

① Dimensions of unidirectional limitations: These are the allowable values of the extreme limits demanded by the dimensions of the human body. If the dimensions surpass these values of extreme limits, sitting or operation will not be comfortable.

There are 22 items that belong to this type of dimensions (for example: items 1, 2, 7, 9 in Table 5.)

② Intermediate dimensions adding to or subtracting from the range of variation: These are the best values determined according to the dimensions of the human body with an allowable range of variations. This means, it is hoped that designs can follow intermediate dimensions.

There are 5 items belonging to this type of dimensions (for example, items 3, 5, 8, 24 in Table 5).

③ A range of dimensions, i.e., for selection within this range while the dimensions do not greatly affect performance.

There are 7 items belonging to this type of dimensions (for example, items 10, 11, 12, 22 in Table 5).

(3) Explanation of some items

The position of the seat in Diagram 9 refers to the middle position.

Besides the dimensions of items 10, 11, all dimensions related to the seat cushion and the seat back are all measured when bearing a load (the weight of the human body is calculated at 65 kilograms). This can eliminate the effect of differences in rigidity of the seat.

① Dimensions of item 13 in Diagram 9: These are the distances measured from the bottom edge of the back of the seat over the front edge of the seat cushion to the clutch and the brake pedals. These dimensions used to be controlled as two dimensions (i.e., the distance from the bottom edge of

the back of the seat to the front end of the seat cushion, and the distance from the front end of the seat cushion to the pedal). In this way, it is possible to select the lower limit or the upper limit for both dimensions and thus causing the dimensions of item 13 to be too small or too large. In addition, in view of the dimensions of the human body (item 14, Table 2), the above dimensions belong to the dimensions of the "length of the outstretched lower limb." Therefore, controlling them as one dimension is favorable to guaranteeing that the foot pedal can be operated well.

(2) The dimensions of item 17 in Diagram 9: These are the dimensions from the steering wheel to the clutch and brake pedals. These dimensions used to be overlooked in past designs. In recent years, because of the attention paid to comfort in driving, the arrangement of the steering wheel is more slanted. If these dimensions are too small, then frequently the knee will hit the steering wheel when the leg is lifted from the foot pedal. Therefore, starting out from guaranteeing rational operation, these dimensions should be controlled.

(3) The dimensions of item 24 in Diagram 9: These are the distances from the center of the driver's seat to the inside of the back frame of the car door. These dimensions were frequently not controlled in past arrangement and design. They were formed by the positions of the steering wheel and the pedals. For light vehicles, these dimensions are frequently too small. When the left hand maneuvers the steering wheel, the elbow easily hits the inner panel of the car door. For trucks of medium tonnage or above, because the gear shift is frequently placed near the symmetric center of the longitudinal car length, these dimensions are too large. As a result, the dimensions of the space on one side of the driver are too large. This hinders looking back while backing up the vehicle. The space on the passenger's side is too crowded and the width of the interior of the driver's cab cannot be rationally utilized.

On the other hand, the unification of these dimensions also benefits standaridzation of the driver's seat. For example, most of the trucks of Western European nations have uniformly installed a suspended driver's seat.

The application of the dimensions of the human body of our nation in the design of vehicles covers a broad range. We have only presented a preliminary measurement and discussion from the point of view of the measurements of the human body and the range of activity of the hands and feet. There is still a lot of in-depth work to be done further.

Even so, we have provided representative measurements according to objective needs and have obtained basic data that can be used in designs. At the same time, we also tried to start out from the viewpoint of human physiology, comfort, maneuverability and safety to present a preliminary view of the dimensions of the operating position of truck drivers (now, the recommended dimensions in Table 5 have been officially approved as the ministerial standards of the First Ministry of Machine Building, the file number of the standards is "JB2667-80," and the standards will be implemented starting August 1, 1980). This has provided a basis of practical significance for overall arrangement, arrangement of the body of the vehicle and seat designs.
9296
CSO: 4008/165

'RENMIN RIBAO' ON TRADITIONAL CHINESE MEDICINE

HK140755 Beijing RENMIN RIBAO in Chinese 8 Jul 82 p 3

[Article by Cui Yueli [1508 2588 3680], minister of public health: "We Should Make Achievements in the Work of Traditional Chinese Medicine"]

[Text] Chinese medicine and pharmacology is a great treasure-house. It is a summation of the experiences of the Chinese people in fighting against diseases. It has a complete theoretical system and rich practical experiences. Its theoretical crux is an organic conception of the human body and dialectical treatment. The reason why traditional Chinese medicine has unlimited vitality is because it can really cure country's medical sciences.

Since the founding of new China, the CCP Central Committee and the old veteran proletarian revolutionaries including Mao Zedong and Zhou Enlai have attached great importance to and have been concerned about traditional Chinese medicine work. As a result, principles and policies on integrating traditional Chinese medicine with Western medicine and inheriting and carrying forward the motherland's medicine and pharmacology were formulated. Chinese medicine and pharmacology were seriously sabotaged during the 10 years of upheaval. The CCP Central Committee has reiterated the party's policy on traditional Chinese medicine since the Third Plenary Session. By means of turning chaos into order, the Public Health Ministry has eradicated "leftist" influences and formulated the principle that "Chinese medicine, Western medicine and integrated Chinese and Western medicine must all be developed and must coexist for a long time to come." In addition, various measures have been adopted to restore, rectify and develop traditional Chinese medicine. At present, the number of hospitals of traditional Chinese medicine throughout the country has increased from 171 in 1976 to 753, more than 8,000 general hospitals at and above county level have set up a department of traditional Chinese medicine and the number of beds set aside for traditional Chinese medicine patients has increased from 15,000 to 57,000. Higher education in traditional Chinese medicine and research in Chinese medicine have also been developed. There are now 22 colleges of traditional Chinese medicine, 1 college of Nei Monggol nationality medicine and some departments of Chinese medicine in certain institutes of Western medicine. The number of academies of traditional Chinese medicine and pharmacology has been increased to 43 and the traditional Chinese medicine research bases in Shaanxi, Hubei and Liaoning are under construction. The national

traditional Chinese medicine contingent has been enlarged from 230,000 people in 1976 to 290,000. Traditional Chinese medicine work has achieved a turn for the better. However, traditional Chinese medicine is still far from fulfilling the objective demands both in quantity and quality.

It is necessary to grasp two major questions in developing traditional Chinese medicine. The first one is to unswervingly implement the party's policy on traditional Chinese medicine; and the other is to maintain and carry forward the characteristics of Chinese medicine in the Chinese medical organs.

As far as implementing the policy of Chinese medicine is concerned, it is of primary importance to further eradicate "leftist" influences. "Leftist" influences have been very serious for a long time in our public health system. Since the third plenary session, although "leftist" influences have basically been overcome in the guiding ideology, we still have to make more efforts and need a relatively long time in order to correct "leftist" mistakes in actual practice. In the past, we obtained great achievements in integrating traditional Chinese with Western medicine and certain comrades have made great contributions to the study of integrated traditional Chinese and Western medicine. However, we have also seen cases in which new medical schools were rashly set up regardless of the circumstances and everybody was forced to learn traditional Chinese medicine, and so forth. Superficially, it seems that great importance has been attached to traditional Chinese medicine, but in fact, none are conscientiously studying Chinese medicine. As a result, people have only become familiar with certain prescriptions but know nothing about the theory of traditional Chinese medicine. The number of veteran traditional Chinese doctors is gradually decreasing and the young ones fail to keep up with them. Such a situation should be changed.

When stressing the implementation of the policy on traditional Chinese medicine, we do not imply, in any sense, despising and discriminating against Western medicine and integrated Chinese and Western medicine. Integrating both Chinese medicine and Western medicine is a principle which we have been consistently upholding. Chinese and Western doctors must learn from each other and encourage each other. This principle was advocated in the past, is being advocated now and will be advocated in the future. We must conscientiously implement the principle of integrating Chinese medicine with Western medicine. However, the crux of the question is in what position has traditional Chinese medicine been placed by the public health and administrative departments. We must explicitly point out that it is wrong for people to think that Chinese medicine is still not scientific and despise and discriminate against Chinese medicine, to only verbally support but actually discriminate against it or take a laissez-faire attitude toward it.

Currently, an outstanding question in Chinese medical treatment, teaching and scientific research is how to maintain and carry forward the characteristics of Chinese medicine. Chinese medicine has its own characteristics in diagnosis, treatment, emergency treatment, application of medicine, nursing and so forth. Chinese medicine which deviates from these characteristics will not be considered as Chinese medicine. If the basic theories of Chinese medicine

such as the five elements, the internal organs and the main and collateral channels, pathogencyand pathogenesis, the four methods of diagnosis and the eight principal syndromes, differentiation of pathological conditions and treatment in accordance with the eight principal syndromes, the principles and methods of treatment, and so forth are discarded, leaving only the simple prescriptions, Chinese medicine and pharmacology will nearly be totally discarded. Thus, the present urgent task is to solve the problem of maintaining and carrying forward the characteristics of traditional Chinese medicine. The hospitals of traditional Chinese medicine must practice by using Chinese medical treatment, prescriptions and differentiation of pathological conditions. Otherwise, it is meaningless to run hospitals of traditional Chinese medicine. As the name must match the reality, the hospitals of traditional Chinese medicine must really achieve this point. However, there are other kinds of work to be done and the crux is the question of the relationship between Chinese medicine and Western medicine. In order to handle well this relationship, it is necessary to carry out meticulous ideological work and organizational work. We must make rational arrangements for Chinese and Western medical personnel, enabling them to play their role and give full play to their enthusiasm.

Some people say that the Chinese medical organs' advocation of maintaining and carrying forward the characteristics of Chinese medicine, taking the Chinese medical theory as the guiding principles and promoting a "pure Chinese medical field," means "separating from Western medicine and going different ways." This is in fact an erroneous view. There is no such thing as pure things in the world. All sciences are, in the course of development, learning from each other, permeating each other and supplementing each other. Neither Chinese nor Western medicine is perfect and flawless, and they must both be developed in the course of incessantly learning new things. When we say maintaining and carrying forward the characteristics of Chinese medicine, we mean that we should restore and develop the characteristics of Chinese medicine in diagnosis, treatment, emergency treatment, application of medicaments, nursing, keeping medical records, bed management and so on. We must also improve the effectiveness of treatment and incessantly develop, perfect and improve in a planned way the professional standard of traditional Chinese medicine. In the course of developing traditional Chinese medicine and pharmacology, we must humbly learn and make use of modern science and technology, make use of modern scientific equipment, study the fundamental theory of traditional Chinese medicine and improve our own diagnosis and treatment methods. Although traditional Chinese medicine and pharmacology have a high effectiveness of treatment, some of them still cannot be explained by modern natural sciences. We believe that in the wake of the development of science and technology, we will improve our understanding and many questions in Chinese medicine which have never been understood will gradually be understood.

In order to solve the problem of personnel and equipment shortages, we must actively develop education in traditional Chinese medicine, practically run well academies of traditional Chinese medicine, colleges of traditional Chinese medicine and pharmacology, colleges of acupuncture and schools of

Chinese medical nursing, and attach great importance to the cultivation of Chinese medical specialists. In areas where demand for Chinese medical treatment is greater than supply, the colleges of Chinese medicine can help doctors to train apprentices in an organized and planned way. The academies of Chinese medicine are bases for carrying forward and developing traditional Chinese medicine and pharmacology and cultivating advanced Chinese medical personnel who have all-round development in their integrity, intellectual mind and physical state and who are both red and professional. In order to train qualified doctors of Chinese medicine, we must carry out education in accordance with the theoretical system of Chinese medicine. We must, on the basis of mastering the theory and treatment methods of traditional Chinese medicine, appropriately learn some Western medical knowledge in order to better carry forward and develop Chinese medicine and pharmacology. But none of this means that we train doctors who are both Chinese and Western medical specialists. The academies of Chinese medicine must strengthen the contingent of teachers and the building of clinical teaching bases. We must make clear that the subordinate hospitals of colleges of traditional Chinese medicine are hospitals of traditional Chinese medicine and not hospitals of integrated Chinese and Western medicine. All personnel must carry out work focusing on carrying forward and developing traditional Chinese medicine and pharmacology. While promoting education in traditional Chinese medicine and pharmacology and training of apprentice, we must also encourage people to learn by themselves. Where conditions permit, localities can open up schools of acupuncture, massage and bonesetting.

While we streamline government structure in the future, the organs in charge of Chinese medical management of the public health and administrative departments cannot be weakened but must be strengthened. Strengthening does not merely mean increasing the number of cadres, but demands a concise number of competent organs and leadership groups and personnel who fervently love Chinese medicine, uphold the party's policy on traditional Chinese medicine and who can carry out investigations, supervise inspections and solve problems. Thus, the overall implementation of the policy on traditional Chinese medicine will be ensured as far as organization is concerned. We must gradually increase the proportion of funds set aside for Chinese medicine. Special state subsidies for Chinese medicine must be really implemented and should not be used for other purposes.

There are still many problems in traditional Chinese medical work and these should be studied and gradually solved. These problems include Chinese medicinal herbs, scientific research in Chinese medicine and pharmacology, systematization of ancient books on Chinese medicine, nationatity medicine and medicinal herbs and so on. We must pay particular attention to integration of Chinese and Western medicine. In the past, general hospitals at all levels throughout the country and hospitals of traditional Chinese medicine have done an enormous amount of work in integrated Chinese and Western medical studies. However, most hospitals have only carried out fundamental work which needs to be further summed up in order to consolidate and develop the achievements. The Ministry of Public Health is now carrying out investigations and is making preparations for the convention of a work meeting. In short, although there are many problems, we can gradually do a good job of work in traditional Chinese medicine by seriously implementing the policy on traditional Chinese medicine and maintaining and carrying forward the characteristics of Chinese medicine.

CSO: 4008/205

PUBLICATIONS

PREFACE TO COLLECTED PAPERS (EXCERPTS) OF THE SIXTH NATIONAL LASER TECHNOLOGY CONFERENCE

Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 9 n. 5, May 82 Preface

[Text] The Sixth National Laser Technology Conference, jointly sponsored by the China Optics Society and the China Electronics Society, was held in Anhui in May 1982.

By 31 Dec 1981, the conference's preparation group received a total of 460 papers (excerpts.) After they were studied twice by the preparation group, 130 papers were chosen to be delivered at the conference. Of these, 27 papers were on laser physics, 51 papers on laser devices, 30 papers on experimental technology and component materials, and 22 papers on applications and other aspects. The conference's preparation group requested the editorial department of the magazine Laser to edit and compile the aforementioned papers (excerpts) into a volume of collected papers. Due to the time limit on submission of papers, the newest research advances just before the conference convened, were not included in these papers (excerpts.) Moreover, due to the rush of editing, parts of the language and contents may be inavoidably inappropriate. Sympathetic understanding of the authors and readers are hereby implored. The papers delivered at the conference are used as the bases for all the information included in all the papers [in this volume.] The authors have the right to resubmit their papers for publication in related journals.

The conference's preparation group wish to express thanks to the editorial department of the laser magazine for the great assistance rendered.

The Sixth National Laser Technology Conference Preparation Group
19 February 1982

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CSO: 4008/1911

PUBLICATIONS

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Shanghai JIGUANG [LASER JOURNAL] in Chinese Vol 9 No 5, May 82 pp i-iv, 108

[Text] Laser Physics

Nonlinear Physics

Excimer Lasers

Solid State Lasers

Miscellaneous Lasers

Experimental Techniques, Components and Materials

Experimental Techniques

Functional Materials

9717
CSO: 4008/191

AUTHOR: CHENG Qingguo [4453 1987 0948]
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WU Liangming [0702 0081 2494]
et al.

ORG: None

TITLE: "The Hongshui River Cable-stayed PC Railway Bridge--Its Design, Construction and Tests"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, 1982 p 18

TEXT OF ENGLISH ABSTRACT: The Hongshui River cable-stayed PC bridge at Laibin, the Hunan-Guangxi Railway Line, is the first railway bridge of that type ever built in China. The main part is a three-span (48 + 96 + 48 m) continuous box girder of uniform depth (3.2 m), rigidly fixed with the pylons. The stay-cable system consists of two pairs of parallel cable planes, each composed of three pairs of inclined cable sets in harp arrangement. The anchorages are designed for possible post replacement or tension adjustment of cables when in service. In the project, special measures are taken for corrosion protection of cables and, in addition, the techniques such as PTFE pot bearings, the high performance retarding-plasticizing agent FDN(R) compound, Model TD-100 universal tensioning jacks, and grooved wedge type composite anchorage, etc., are used.

[Continuation of TUMU GONGCHENG XUEBAO No 2, 1982 p 18]

In this paper, a brief description of the structural features, desing principles and construction methods of the bridge is given; the model investigations, including 1:30 bridge model, 1:4 joint model and wind tunnel test secretion model, and the rating tests for both static and dynamic loading conditions are outlined.

9717

AUTHOR: XU Bangdong [1776 6721 2767]

ORG: Northwest Research Institute, Ministry of Railways Academy of Scientific Research

TITLE: "Landslide Control of Railway Lines in China"

SOURCE: Beijing TUMU GONGCHENG XUEBAO [CHINA CIVIL ENGINEERING JOURNAL] in Chinese No 2, Jun 82 pp 77-84

ABSTRACT: Based upon the practice of taking care of landslide damages to railroad beds of many years, this paper proceeds to summarize the experience. Various phenonmena and various stages of development of landslides are classified and described. Some cases, such as the Kunhe Railway constructed in 1911, the Guikun Line at Nuokui Station, and the Baocheng Line at Dingjiahe have been constantly threatened by landslides. Photos are included in the paper to illustrate these conditions. Finally, some cases of successful landslide control are related. The paper also mentions the Fourth Landslide Control Experience Exchange Conference held in Lanzhou in 1973 when the landslide control techniques in China and in foreign countries were summarized and compared. In reality, the various measures used in foreign countries have all been tried in China. Of these measures, the rigid slide-resistant engineering measures are applied more frequently; electoosmotic drainage, chemical grouting, baking, etc. landslide control techniques have rarely been applied, however.

6248
CSO: 4009/361

AUTHOR: WANG Bingnan [3769 3521 0589]

ORG: Electrical Engineering Institute, Chinese Academy of Sciences

TITLE: "Faraday MHD Generator--The Equivalent Circuit and Its Cutset Solution"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese No 3, 1982 pp 41-46

TEXT OF ENGLISH ABSTRACT: A four-terminal network of Faraday's MHD element generator and the complex equivalent circuit with it given here are of greater generality than the existing ones. The cutset method can be used for solving circuit problems in the MHD generator under various loading conditions.

AUTHOR: LI Xixiong [2621 6932 7160]

ORG: Huazhong University of Science and Technology

TITLE: "Reliability and Stability of Integrated Digital Control System"

SOURCE: Wuhan HUAZHONG GONGXUEYUAN XUEBAO [JOURNAL OF HUAZHONG UNIVERSITY OF SCIENCE AND TECHNOLOGY] in Chinese No 3, 1982 pp 47-56

TEXT OF ENGLISH ABSTRACT: The IC element processing, the circuit state to be chained and interlocked, the potential-controlled information to be pulsed and the intrusion prevention and suppression of noise are investigated in order that the reliability and stability of the integrated digital control system can be duly improved.

9717
CSO: 4009/362

AUTHOR: None

ORG: Research Laboratory of High Temperature Gas Dynamics and Plasma Technology, Institute of Mechanics, Chinese Academy of Sciences

TITLE: "The Effects of a Transverse Magnetic Field on a Non-equilibrium Ionized High-velocity Gas Stream"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese No 3, 1982 pp 291-296

TEXT OF ENGLISH ABSTRACT: The effects on a non-equilibrium, ionized, high-velocity gas stream of a strong magnetic field normal to the stream are studied by experiments and analysis. The electron density in the test stream of a small arc tunnel was reduced by an order of magnitude by this method, indicating that this is one way to partially control the electrical parameters in a low-density arc-heated wind tunnel.

AUTHOR: TANG Fulin [0781 4395 2651]
XUE Minglun [5641 2494 0243]

ORG: Both of the Institute of Mechanics, Chinese Academy of Sciences

TITLE: "The MHD Equilibrium and Instability of Infinitely Long Belt-pinch"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese No 3, 1982 pp 302-307

TEXT OF ENGLISH ABSTRACT: In this paper the highly elongated belt-pinch is taken as an infinitely long tube under the conditions that both the poloidal magnetic flux and current are conservative in plasma. The toloidal plasma current density is described by $\vec{J}_\varphi = 2\pi ra + \frac{\mu}{4\pi r}b$. Equilibrium relations are derived analytically. For given m the instability growth rate $\bar{\omega}$ calculations are performed, and the effect of the poloidal beta β_p is considered when the plasma is surrounded by a vacuum. When $\bar{k}$ is varied at a fixed m, the growth rate runs through a maximum. The maximum growth rate increased with increasing m and the poloidal beta β_p has little influence on the maximum growth rate. The order of the calculated ω is 10^5 1/sec, which is consistent with experimental findings.

9717
CSO: 4009/368

AUTHOR: None

ORG: Department of Water Conservancy Engineering

TITLE: "Research on the Problem of Silt in Huanghe"

SOURCE: Beijing QINGHUA DAXUE XUEBAO [JOURNAL OF QINGHUA UNIVERSITY] in Chinese Vol 22 No 2, May 82 p 30

ABSTRACT: For a long time, the teachers and students of the Department of Water Conservancy of Qinghua University have cooperated with the Huanghe Water Conservancy Committee in a series of research studies on controlling Huanghe. In 1969, the department participated in the research and designing work of the Sanmenxia Reconstruction project. In 1979, on the basis of the more than a decade of work, the paper, "Opinions Concerning the Control of Middle and Lower Reaches of Huanghe" was proposed. Related agencies have paid attention to these opinions and confirmed them. The key problem of Huanghe is silting and the silt mainly damages the lower reaches while the origin of the silt is the middle reaches. The silt built-up in the channel of the lower Huanghe is composed mainly of sand granules greater than 0.05 mm in diameter and this course sand comes largely from the 2 regions of from Hekoudian to the mouth of Wudinghe and the source of water at Baiyushan. The floodwater of these 2 regions often causes tremendous accumulation of sand in the lower reaches; according to analyses of 1952-60 of 103 floods, the average daily silt build-up reaches 3,000 tons coming from the 2 regions, amounting to 60 percent of the total accumulation in the lower reaches. According to statistics, about 80 percent of the coarse sand

[continuation of QINGHUA DAXUE XUEBAO Vol 22 No 2, 1982 p 30]

come from areas measuring 100 thousand km^2 and 60 percent of it from areas of 50 thousand km^2, where the modulus of erosion reaches 8000-10000 tons/km^2 a year. It is suggested that the State should invest a capital of 1 billion yuan to cooperate with the local masses to concentrate all capabilites on treating these areas of 50 thousand km^2 of the chief source of coarse sand, at an expenditure of 20 thousand yuan per km^2. A Silt Research Office was established by the department of the university in 1978 and in 1981, the establishment of a new silt experiment laboratory was proposed. Aside from studying the silt problem of Huanghe, the laboratory should also proceed with research on the basic theory of water flow of high sand content, a silt model experiment of the backwater regions of the Changjiang Gezhou Dam and the Changjiang Sanxia Engineering Project, and such subjects as long distance pipeline transport of slag and coal, etc. as well as train a group of graduate students.

AUTHOR: None

ORG: None

TITLE: "New Results of Scientific Research in 1981"

SOURCE: Beijing QINGHUA DAXUE XUEBAO [JOURNAL OF QINGHUA UNIVERSITY] in Chinese Vol 22 No 2, May 82 p 112

ABSTRACT: In 1981, the university won 40 awards for scientific research in various fields, in addition to the publication of 982 papers. In the year, 49 scientific and technological products of the university were certified, approved, and put into application. These include the TF-2 graph generator, with a variance $\leq \pm 1\mu$. The Department of Chemical Engineering cooperated with Shandong Qilu Oil Refinery in producing some new designs to improve the rate of reclaimed heat and to reduce energy consumption. The Nuclear Energy Center of the university succeeded in developing the hollow cathode discharge ion plating technique. It has been used to produce batches of golden watch-cases for many watch manufacturers of the country. With the cooperation of related restaurants, the Department of Automation completed the "restaurant dining room management automation technique." The biomedical engineering research, the radio, and the electrical machinery departments also reported several accomplishments in the year 1981.

6248
CSO: 4009/345

AUTHOR: DING Huiliang [0002 1920 2733]
CHEN Wenpu [7115 2429 3184]
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WU Fang [2976 6078]

ORG: None

TITLE: "An Optimum Design of Fuselage Structure"

SOURCE: Wuchang GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, 1982 p 164

TEXT OF ENGLISH ABSTRACT: This paper briefly presents the application of the "improved" fully stressed design (FSD) method to fuselage structure design. In addition to the conventional stress and minimum gauge constraints, the component buckling constraints are also involved. When component buckling constraints are considered, the oscillation in stress-ratio redesign can be effectively damped by means of the "under relaxation" factor derived in this paper. In addition to the commonly used bars, panels and beams, some "dummy" and scalar elements are used to avoid the "ill condition" of idealized model of the complex fuselage structure.

The computer program is composed of some modules, so it is very easy to modify or extend for further development. There are also some options in the program,

[Continuation of GUTI LIXUE XUEBAO No 2, 1982 p 164]

including adjustments to the converged design and a final structural analysis, in order to make the results more reliable.

In the sample application to a fuselage structure, the design is basically converged after only five iterations. The converged design is satisfactory and is about 11 percent lighter than the initial one.

9717

AUTHOR: CHEN Zishu [7115 1311 1859]

ORG: None

TITLE: "The Second National Conference on Nonlinear Vibration Held in Huangshan"

SOURCE: Wuchang GUTI LIXUE XUEBAO [ACTA MECHANICA SOLIDA SINICA] in Chinese No 2, May 82 pp 311-312

ABSTRACT: China's Second Nonlinear Vibration Scientific Exchange Conference was held in Huangshan, Anhui Province on 10-17 Nov 81. Participants included mathematicians, physicists specializing in mechanics, etc. representing 75 institutions of higher education and scientific research; there were 108 delegates. Compared with the first conference and judging from the composition of the delegates, a team of scientists specializing in nonlinear vibration theory appears to be basically established in China. The conference proceeded in 2 stages: The first stage was devoted to reading and exchanging 67 papers, the contents of which covered the analytical method, the qualitative method, parameter vibration, structural vibration, vibration machines, rotor dynamics, electrical power transmission, transport machines, etc. The second stage was devoted to special subject reports; 12 special subject reports were delivered, covering such subjects as random vibration in a nonlinear system, etc. All delegates agreed that it is absolutely necessary to have this type of conference at least once every 2 years. It was proposed that the next conference should be held in the autumn of 1983; Tianjin University was asked to be responsible for its preparation.

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